

4.—CONTRIBUTIONES FLORAE AUSTRALIAE OCCIDENTALIS VI.

(With Four Plates xxiv.-xxvii.)

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Septem novae species hic descriptae, duo si exceptis, sunt e recentibus collectionibus ab auctore ipso factis, earum typi inveniuntur apud Herbarium, Departmenti Agriculture, Perth.

Novae species propositae sunt quae sequentur:

- Casuarina fibrosa.
- Banksia violacea.
- Banksia audax.
- Dryandra erythrocephala.
- Baeckea muricata.
- Astartea heteranthera.
- Balaustion microphyllum.

Quae sequenter sunt potius synonyma:

- Casuarina horrida, Herbert.
- Casuarina spinosissima, Gardner.
- Casuarina leptotrema Sp. Moore.
- Adenanthos intermedius, Ostenfeld.
- Adenanthos intricata, Gardner.
- Dryandra teretifolia, Morrison.
- Pultenaea astipulea, Herbert.
- Pomaderris Mayeri, Gardner.
- Hannafordia Bissillii, F. v. M., var. latifolia, Pritzel.
- Melaleuca coronicarpa, Herbert.
- Duboisia Campelli, Morrison.

Casuarina fibrosa, Gardner, n. sp. Plate xxiv. A-F.

Frutex parvus erectus, dense ramosus, ramulis ramisque erectis, dense appressis. Internodis 3-4, fere teretibus, internodus ad basin positus brevius omnibus, estque eximie striatus et ex apice pungenti acuto. Verticillus dentatis 4, scariosus ad basin vaginatus; apicibus irregulariter divisus. Amentis masculis non visis.

Strobilis ovoidei-globularibus, arete sessilibus in annoso ligno, abscanditis inter ramas compressas. Bracteis pusillis, bracteolis exsertis, gracilibus, ovato-lanceolatis, acutis, appendice dorsali triangulari, parce truncatis vellatis e rudibus fibris, pilus simulantibus, nascentibus ex exteriori basi bracteolarum multo longioribus bracteolis ipsis. Achaenibus glabris, luteofuscis, ovoidiis, ala achaenibus ampliori, subacutis e parvo puncte cuspidato.

Frutex ca. 30-40 cm. altus, ramulis 2.6-3 cm. long. Strobilus 1.5-1.7 cm. long \times 1.4 cm. lat.

Hab. in distr. Avon prope Tammin in arenosis aridis apertis. Sept., 1926. (C. A. Gardner.)

A small erect densely branched shrub, branchlets and branches erect, densely crowded. Internodes 3-4, terete or almost so, the basal one the shortest, finely striate, the apex pungently acute. Teeth of the whorl 4, scarios, united at the base to form a sheath, the apices irregularly divided. Male amenta unknown.

Cones ovoid-globular, closely sessile on the older wood and hidden among the dense branches. Bracts small, thickened into a broad shortly-pointed apex; bracteoles exerted, thin, ovate-lanceolate, acute, the dorsal appendage triangular, shortly truncated, hidden by coarse hair-like fibres which arise from their outer bases and much exceed the bracteoles in length. Achenes glabrous, reddish-brown, ovoid, the wing broader than the achene, sub-acute with a small cuspidate point.

The new species belongs to the series with 4-6-merous whorls and definite internodes, its affinity being with *C. microstachya* and *C. grevilleoides*. It differs from the former in the terete branchlets and the bracteoles, and from *C. grevilleoides* in the glabrous achene and number of internodes, differing from both, however, in the long fibrous appendages of the bracteoles. The habit is more like that of *C. grevilleoides* than of *C. microstachya*.

Banksia violacea, Gardner, n. sp. Plate xxiv. K-O.

Fruticulus humilis, rigidus, dense ramificatus, omnino glabris inflorescentia excepta. Foliis compressis in ramulis, erectis, lineari-oblongis, mucronatis, planis, crassis, subtus bisulcis vel subcanaliculatis, margine arcte revolutis. Spicis terminalibus, globosis, erectis vel rare reflexis, rhachis brevis. Bracteis dense tomentoso-villosis, etiam ad apicem. Perianthium atro-violaceo, parce sericeo e pilis albis appressis, pilis in ovoideo-elliptico limbo densior appressis, pallidis, Ovario glabro. Stylo apprehenso per stigmatem obtuse conicum ad basin incrassatum. Conus fructiferens globosus, crassis glabris capsulis truncatis, conjunctim valde appressis, turgidis planis.

Fruticulis 25-35 cm. alt. Folia 1.0-1.5 cm. long., 1.5 mm. latus. Spicis ca. 4.9 cm. diam. rhachi 2.0-2.3 cm. long. Perianthiam ca. 1.7 cm. long. limbo 2.5 mm.

Hab. in distr. Stirling, ab Lake Grace orientem versus, in arenosis fruticetis apertis, fl. m. Decem. (C. A. Gardner.)

A small, erect, densely branched shrub, quite glabrous except the inflorescence. Leaves rather crowded on the branchlets, erect, linear-oblong, mucronate, flat and thick, the margins so very closely revolute as to give the impression of a flat entire leaf, the broad midrib only evident on the lower side. Spikes terminal, globular, erect or rarely reflexed, the rhachis short. Bracts densely tomentose-villous without any glabrous apex. Perianth dark purple-violet, sparingly silky with short oppressed white hairs, the limb ovoid-elliptical with rather denser appressed yellowish hairs, more or less acute. Ovary glabrous. Style remaining hooked with an obtusely conical stigma swollen at the base. Fruiting cone globular, the thick glabrous capsules truncate and closely pressed together, turgid and smooth.

This species of the Section *Oncostylis* is close to *B. nutans*, differing principally in the less conspicuous bracts which have not the prominent glabrous umbonate tips of that species, the violet flowers (not yellow), the smaller broader leaves not deeply channelled above, and the habit, together with a differently proportioned perianth-limb, as well as the vestiture of the perianth.

Banksia audax, Gardner, n. sp. Plate xxiv. G-J.

Frutex parvus e fere diffusis ramis, glaber, spicis exceptis. Folia dispositis in brevibus lateralibus ramulis, lineari vel oblongo-cuneatis, truncatis, coriaceis, rigidis et planis, marginibus dentatis, dentibus paucis, brevibus, pungentibus, sini non profundi; facies superiori plana, media costa centralis leviter impressa, venis anastomosis non valde visibilibus in facie inferiori.

Spicis ovoidis, super pedunculos longos, floribus aurantiaco-pallidis. Bracteis ferruginoso-tomentosis. Perianthio oblongum obtusum limbum habente dense tomentoso-villosum, sub limbo tenuiter villosa cum capillis pallidioribus. Stylo rigido perianthio longiore, ovario glabro super parvum stipitem villosum ex longis sericeis albis pilis.

Capsulis denso appressis apud durum lignosum conum, valvis tomentosis fere absconditis apud reliquias florum persistentes.

Frutex 30-40 cm. alt. 70-80 cm. diam. Folia 4-6 cm. long., ad 1.5 cm. lat. Spicis 5.5-6.5 cm. long., 5.0 cm. latus. Perianthium ca. 2.0 cm. long. limbi lobi 4.5 cm.

Hab. in Distr. Coolgardie, in arenosis aridis apertis prope Bronti, flor. m. Decem. (C. A. Gardner, Dec. 1926.)

A low shrub with spreading, almost diffuse, branches, glabrous except the spikes. Leaves clustered on the short lateral branchlets, linear-cuneate to oblong-cuneate, truncate, coriaceous, rigid and flat, the margins dentate, the teeth few, short and pungent, the sinuses separating them not deep, the upper surface smooth with the midrib slightly impressed, the anastomosing veins not very evident on the under surface.

Spikes ovoid, on usually long peduncles, the flowers golden-yellow. Bracts ferruginous-tomentose. Perianth with an oblong obtuse limb densely tomentose-villous, the slender part below the limb scantily villous with paler coloured hairs. Style rigid, longer than the perianth, the ovary glabrous on a short thick stipes villous with long silky white hairs. Capsules densely packed in the hard woody cone, the valves tomentose, almost concealed in the persistent remains of the flowers.

This species belongs to the Section *Cryptostylis* of Bentham, and is nearest to *B. attentuata* and *B. media*. *B. attenuata* is a tree with very different leaves and cylindrical spikes and a glabrous perianth. It differs from *B. media* in the shape of the leaf, and more decidedly in the perianth limb, which in *B. media* is never tomentose, and more elongated and angular. I fail also to find any hairs to the stipes in Maxwell's specimens of *B. media*, but these are very old.

Dryandra erythrocephala, Gardner, n. sp. Plate xxv. A-H.

Fruticulus compactus humilis, foliis erectis fasciculatis, attenuato-petiolaris, pinnatipartitis, lobi remotis, patulis, sinu brevioribus, lineari-subulatis, pungentibus, margine revolutis, subtus tomentosis, rhachi anguste-linearibus. Capitulis terminalibus, sessilibus, foliis floralibus obvallatis; squamis exterioribus linearibus plumosis, interioribus setaceo-acuminatis. Perianthium elongatum, supra basim glabrum, dense lanatum, laminis glabris purpureis, stigmatate tenui subacuto.

Fruticulus 15-25 cm. alt., folia 5-8.0 cm. long., lobi 3-6 \times 1 mm.; involu-
crum ad 2.5 cm. long. (foliis floralibus exceptis); perianthii segmenta 3.8
cm. long., limbi lobi 7 mm. Stylus 3.6-3.7 cm. long.

Hab. in distr. Stirling ab Pingrup orientem versus in arenosis aridis
fruticulosus, flor. m. Decem. (C. A. Gardner, Decem. 1926.)

A small compact shrub of low stature, the branches covered with persist-
ent bases of the fallen leaves, otherwise leafless except towards the summit.
Leaves crowded around the flower-heads, deeply pinnatifid with rather distant
linear or lanceolate pungent segments, the margins revolute, reddish-tomen-
tose underneath. Flower-heads narrow, terminal on the crowded short ter-
minal or lateral branchlets, and buried in the numerous floral leaves which
much exceed the flowers in length. Outer involueral bracts indistinguishable
from the floral leaves, the inner linear-setaceous, dark-coloured with a narrow
scarcely dilated base and long plumose points, shorter than the flowers.

Perianth turgid above the glabrous base, densely white-villous on the
swollen part, the slender portion of the claws sparingly pubescent in the
lower part, the greenish upper portion and the bright red limb glabrous.
Style shorter than the perianth, the stigmatic end slender, sub-acute and
smooth.

This species has the characters of the *Obvallatae* and the *Armatae*;
and demonstrates the affinity between the two series. From *D. Fraseri* it
differs in habit, involucre, and the structure of the perianth, but has the
same terminal though more crowded inflorescences. Among the *Obvallatae* it
is closely related to *D. seneciifolia* and *D. cirsioides*, differing from both in
the terminal inflorescences; from *D. seneciifolia* in the smaller involucre and
much larger and different perianth, and from *D. cirsioides* in the leaves, the
involueral bracts, and (according to Meissner's description) in the vestiture
of the perianth. It doubtless has some affinity to *D. Purdieana* but is very
different in the leaves and involucre.

Baeckea muricata, Gardner, n. sp. Plate xxvi.

Parvis diffusus frutex etiam juvenibus ramis inclusis, ramis rigidis;
foliis et calycibus muricatis processibus in calyce prominentioribus quam in
descrepitis ramulis. Foliis oppositis in parvis lateralibus ramulis, magis
minusve erectis, oblongo-linearibus, subteretis, obtusis, subtus canaliculatis.

Floribus solitariis, e parvo pedicello, articulatis, bracteolis ad basin duo,
angustis, deciduis, rare duo vel tres flores in eundem parvum pedicellum.
Tubo calyceo campanulato-turbinato, muricato cum longioribus processibus
quam in foliis et ramulis, lobis parvis et angustis, crasse muricatis. Petalis
orbicularibus, albis, crispis; staminibus 20, inflectis nequaquam oppositis
petalis; filamenta vix ad basin dilatata; connectivum prominens; antheris fere
globularibus. Ovarium triloculatum, locis 6-9-ovulatis.

Frutex 50-80 cm. altus. Folia 2.5-4.0 mm. long. Pedicellis ca. 2 mm.
long. Calycis tubus 2.5 mm. long; calyx cum lobis 3.5 mm.; petala 3.5 mm.

Hab. in distr. Coolgardie prope Brenti, in arenosis fruticetis, fl. m.
Decem. Eadem pr. Carrabin, in acaciis lutosus, fl. m. Novem.-Decem. (C.
A. Gardner, Dec., 1926).

A low spreading shrub with rigid branches, the whole plant including the younger branches, leaves and calyxes muricate with stout but soft processes which are however most prominent on the calyx, those on the older branchlets soon wearing off. Leaves mostly along the short lateral branchlets, more or less erect or slightly spreading, but not imbricate, oblong-linear, subterete, obtuse, channelled underneath, covered all over with stout hair-like semi-transparent processes.

Flowers solitary on a short pedicel articulate with two narrow deciduous bracteoles at the base, or rarely 2 or 3 flowers together on a short peduncle. Calyx-tube campanulate-turbinate, muricate with much larger processes than those of the leaves and branchlets, the lobes short and narrow, also thickly muricate and separated by broad intervals. Petals orbicular, white, crisped. Stamens 20, inflected, none opposite the centre of the petals; filaments scarcely dilated towards the base, the connective prominent; anthers almost globular, the cells opening in oblong terminal pores. Ovary 3-celled, with 6-9 ovules in each cell.

This species, belonging to the Section *Babingtonia*, appears to be fairly close to *B. robusta*, but differs from it in the pedicels, calyx-lobes, and from this and all other species of the genus at present known in the remarkable vestiture, particularly that of the flowers.

Astartea heteranthera, Gardner, n. sp. Plate xxvii.

Parvus diffusus frutex, glabrus, ramis mollibus, diffusis. Foliis lineari-clavatis, subteretibus, obtusis, potius crassis, ad basin angustis, apud breves laterales ramulos congestis. Floribus solitariis pedicellis foliis superantibus, articulatis, proper basin cum duobus parvis lanceolatis concavis bracteolis. Calycis-tubo turbinato-rotundo, plano vel obscure quinque costato; lobis parvis et amplis, rotundis, centris incrassatis. Petalis orbicularibus, integris, albis. Staminibus ca. 10-12 brevibus, irregulariter inferne in anulum confluentibus, loculis antherae distinctis, ovoideo-globularibus, longitudinaliter dehiscentibus. Ovario 3-loculari; summitate convexa, stylo inserto in depressione centrali. Ovulis 2, collateralibus.

Frutex ca. 40 cm. altus; foliis 3-7 mm. longa. Calyx cum lobis ca. 3.5 mm. latus, 2-2.5 mm. altus. Pedunculi 4 mm. longa; petala 3 mm. diam.

Hab. in distr. Avon prope Wongan Hills, in arenosis, flor. m. Aug. et Sept. (E. H. Ising, Sept., 1925.)

A small spreading shrub with slender spreading branches, quite glabrous. Leaves linear-clavate, subterete, obtuse, rather thick, narrowed towards the base, clustered on the short lateral branchlets. Flowers solitary on slender pedicels exceeding the leaves, articulate near the base with two small lanceolate concave bracteoles. Calyx-tube turbinate-hemispherical, smooth or obscurely 5-ribbed; lobes short and broad, hemispherical with thin coloured margins and thickened centres. Petals orbicular, entire, white. Stamens usually 10-12, the filaments of unequal length but all short and dilated, more or less united in a ring deeply divided into five segments opposite the sepals, but variable in size, usually with a short filament between

two longer ones, or the bundle consisting of united filaments with one anther, or sometimes two or four anthers in the segment. Anther cells distinct, ovoid-globular, opening longitudinally in front of the summit of the filament. Ovary with a convex 3-angled summit, 3-celled, the style inserted in a central depression. Ovules 2 in each cell, collateral.

This new species is close to *A. ambigua*, F. v. M., which Niedenzu unites with *Baeckea*. Since, apart from the above species, I know of no species of *Baeckea* with united filaments I have placed the new plant in the genus *Astartea*. It differs in several respects from *B. astarteoides*, and is closer to *Baeckea* (*Astartea*) *ambigua*, differing in the leaves, and the number of ovules in the cells. The species, together with *B. ambigua*, appears to hold an intermediate position between *Baeckea* and *Astartea*. I have not seen Niedenzu's work and therefore do not know what are his proposed limits to the genus *Baeckea*.

Balaustion microphyllum, Gardner, n. sp. Plate xxv. I-L.

Frutex parvus dense ramosus, ramis et ramulis erectis, ramis dense coopteris ex appressis imbricatis foliis. Foliis oppositis, erectis, decussatis, arcte imbricatis, orbicularibus, obtusis, concavis, aliquantulum carinatis, glandulare-punctatis, marginibus fimbriati-ciliatis.

Floribus 2, regulariter in superioribus axillis, super parvos tenues pedicellos. Bracteolis parvis, orbiculari-ovatis, acutis, carinatis et ciliatis. Calycis-tubo cylindrico-campanulato, piloso-glandulare, lobis semiorbicularibus, valde amplis et obtusis, fimbriatis. Petalis orbicularibus, intense cinnabarinis, ad apicem fimbriatis. Staminibus plurimis, filamentis parce planis, valde glanduloso-tuberculatis. Stylo staminibus longiore.

Frutex circ. 20 cm. alt.; foliis 1.3 mm. long. vel breviora. Bracteolae 1.5 mm.; calycis tubus 6 mm. long, 4 mm. lat. lobae .8 mm. long.; petala 2.5 mm. diam.

Hab. in distr. Austin pr. Koolanooka, in arenosis, fl. m. Sept. leg. (Hugo V. Throssell.)

A small shrub dense and bushy with erect branches and branchlets, the branchlets densely covered with crowded imbricate leaves. Leaves opposite, erect, decussate, closely imbricate, orbicular, obtuse, concave, somewhat keeled, glandular-punctate, the margins fimbriate-ciliate. Flowers in pairs, mostly in the upper axils on very short slender pedicels. Bracteoles small, orbicular-ovate, acute, keeled and ciliate. Calyx-tube cylindrical-campanulate, glandular-hairy, the lobes semi-orbicular, very wide and obtuse, fimbriate. Petals orbicular, intense scarlet, fimbriate at the tips. Stamens numerous, the filaments scarcely flattened, very glandular-tuberculate. Style longer than the stamens.

This striking little shrub appears to be worthy of specific rank. In the first place it has nothing of the habit of *B. pulcherrimum* which is prostrate or diffuse. The leaves are different as regards both shape and size, and in the manner in which they crowd and conceal the branchlets entirely. The flowers are much smaller, the bracteoles and calyx are not brightly coloured as in *B. pulcherrimum*, and the vestiture of the green calyx-tube with yellow viscid hairs has no counterpart in *B. pulcherrimum* as at present defined. The glandular filaments are also distinctive.

This plant would appear to be developed from *B. pulcherrimum* in a northern area isolated from the range of that species, and for this reason I have had some misgivings in proposing it as a distinct species, but according to the accepted conceptions of new species at the present time, these differences may be considered as specific.

The following species are regarded as synonyms:—

Casuarina horrida, Herbert, Proc. Roy. Soc., W.A. vii. 87 (1921).

This plant in no respect differs from *C. corniculata*, F. v. M.

Casuarina spinosissima, Gardner, l. c. ix. (part 1) 38 (1923).

I have now to regard this plant as a large form of *C. corniculata*, differing only in the larger cones and the longer and stouter spines. The shrub however is much larger and more virgate than the commoner form, the rigid branches being thick and glaucous. There are no differences, however, which could be taken as of specific value.

Casuarina leptotrema, Sp. Moore, Journ. Linn. Soc.—Botany, xlv. (1920) 193.

I have not seen any of Spencer Moore's material, but the distinctions given in his diagnosis are not of a character sufficient to establish a new species. *C. humilis* has commonly 4-6 teeth in the whorls, the size and proportion of the cones is somewhat variable, and the colour of the seeds is a very weak diagnostic character, depending upon the state of the cone in the specimens collected. For example, I have found both yellowish-brown and black achenes in one specimen of *C. corniculata*. The comparative width of the seed is also not a reliable characteristic. *C. leptotrema* is, in my opinion, only one of the numerous forms of *C. humilis*.

Adenanthos intermedius, Ostf. Det. Kgl. Danske Videnskab., Selskab., Biol. Meddel iii. 2.

This plant (Ostf. 674) is *Adenanthos barbigera*. It is true that the leaves are shorter and wider than the common narrow-leaved form prevalent in the hills near Perth, but the bracts, the flowers and the vestiture are exactly those of *A. barbigera*. Ostenfeld has pointed out that in appearance the plant is intermediate between *A. barbigera* and *A. obovata*, but the differences are superficial and do not apply further than the leaves. *A. barbigera* is not, as Ostenfeld states, confined to the Swan River district, but extends much further south.

Adenanthos intricata, Gardner, Proc. Roy. Soc. W.A. ix. (part i.) 39.

This plant in no respect differs from *A. argyrea*, Diels.

Dryandra teretifolia, A. Morrison, in Journ. Bot. 1912, 1. 279.

There is a specimen of this plant in the Departmental Herbarium bearing a label in Morrison's handwriting. The plant is *Petrophila circinata*.

Pultenaea astipulea, Herbert, Proc. Roy. Soc. W.A. viii. 36 (1922).

This species is conspecific with *Phyllota Georgii*, Hemsl, but should perhaps be placed under *Pultenaea*.

Pomaderris Mayeri, Gardner, l. c. ix. (part i.) 41.

This is *P. Forrestiana*, F. v. M., the description of which was overlooked at the time of describing the plant.

Hannafordia Bissillii, F. v. M. var. *latifolia*, E. Pritzel, in Engler's Jahrb xxxv. 371.

What is probably this plant was described as *H. Kesselli*, Gardner in Journ. Roy. Soc. W.A. ix. 103, without reference to Pritzel's variety. *H. Kesselli* is specifically distinct from *H. Bissillii*, and therefore Pritzel's variety, which answers perfectly to the plant, hereby becomes a synonym. Pritzel appears to have overlooked the floral distinctions, establishing his variety on habit and leaf alone. Owing to this omission, *H. Bissillii*, var. *latifolia*, was not acknowledged when *H. Kesselli* was described.

Melaleuca coronicarpa, Herbert, Journ. Roy. Soc. W.A. viii. (1922) 35.

This appears to be one of the forms of *M. cardiophylla*. I can detect no differences which might be accounted specific. The only constant difference is that the style is short in *M. cardiophylla*, while Herbert states that the style is almost as long as the stamens in his plant. The var. (?) *longistaminea*, F. v. M., with its quite different habit and much larger green flowers, is perhaps worthy of specific rank.

Duboisia Campbelli, Morrison, in Journ. W.A. Nat. Hist. Soc. iii. 15 (1905).

This plant, a specimen of which is labelled in Morrison's handwriting, agrees perfectly with his description, but is wrongly placed. The plant is *Eremophila saligna*, Sp. Moore.

EXPLANATION OF PLATES.

PLATE XXIV.

Casuarina fibrosa, Gardner (A—F).

A. Branchlet—nat. size; B. Branchlet (enlarged); C. Cone; D. Dorsal view of bracteole and appendages; E. The same with the appendage removed; F. Achene.

Banksia audax, Gardner (G—J).

G. Leaf; H. Perianth; I. summit of style; J. ovary and stipes.

Banksia violacea, Gardner (K—O).

K. Leaf (upper surface); L. lower surface of leaf; M. transverse section of leaf; N. Perianth; O. stigma and portion of style.

PLATE XXV.

Dryandra erythrocephala, Gardner (A—H).

A. Leaf (upper surface); B. Leaf (lower surface); C. upper part of leaf (under surface, enlarged); D. leaf-section; E. and F. Bracts; G. Perianth; H. limb.

Balaustion pulcherrimum, Gardner (I—L).

PLATE XXVI.

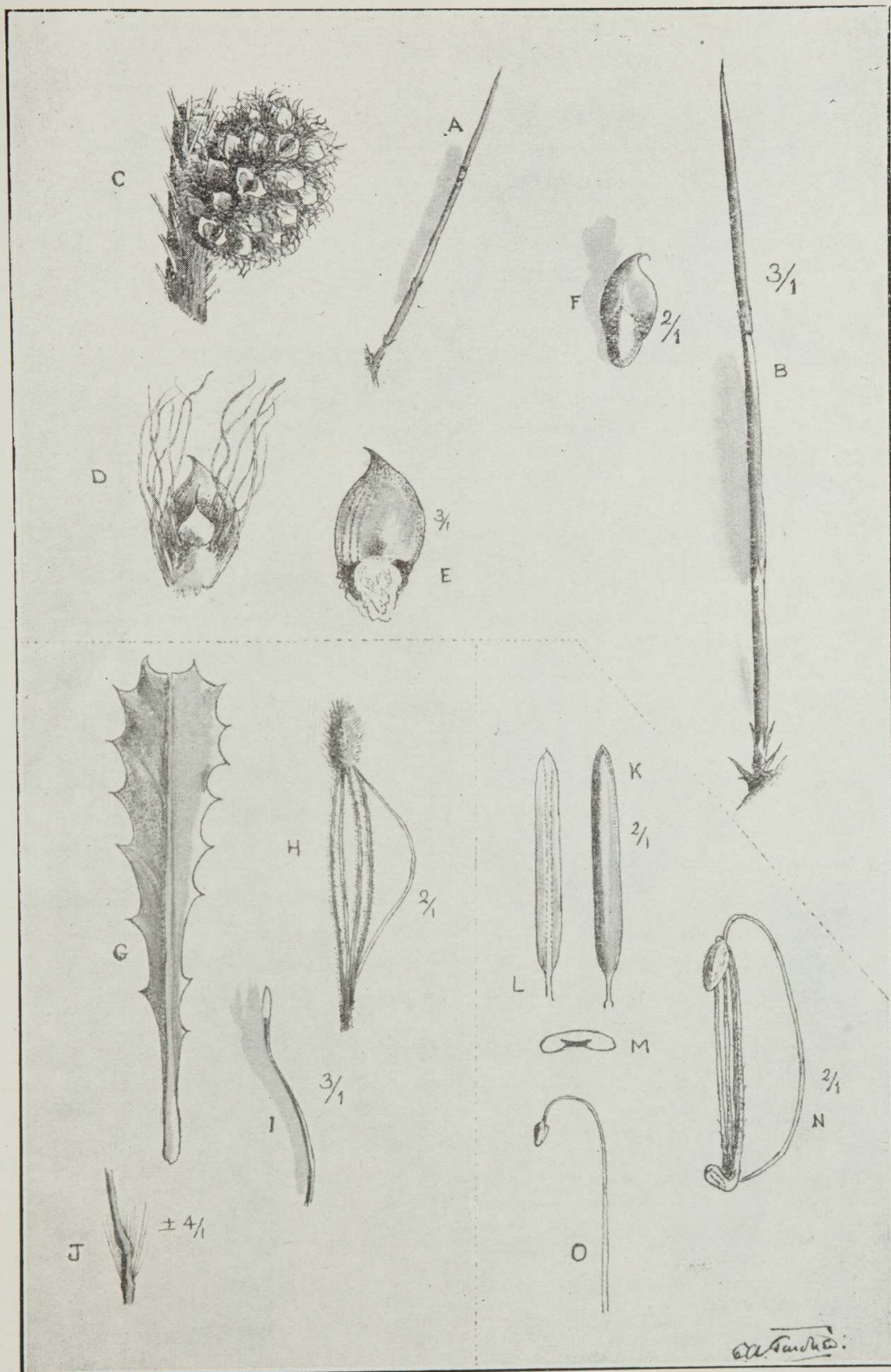
Baeckea muricata, Gardner (A—D).

A. Branch; B. Leaf; C. Flower with two petals removed; D. Stamens.

PLATE XXVII.

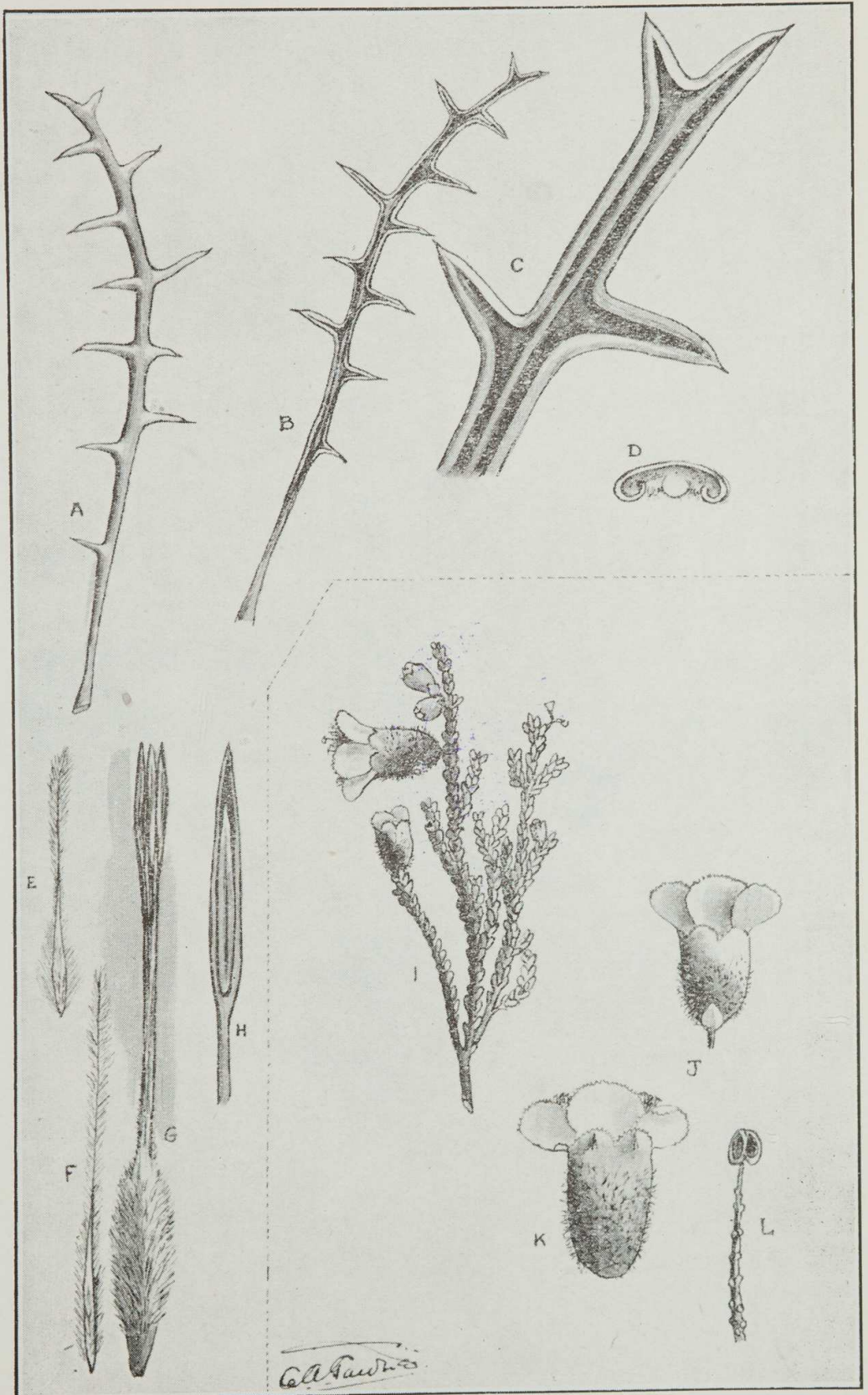
Astartea heteranthera, Gardner (A—D).

A. Branchlet; B. Flower with two petals removed; C. Staminal bundles; D. longitudinal section of ovary.



A-F. *Casuarina fibrosa*.
 G-J. *Banksia audax*.
 K-O. *Banksia violacea*.

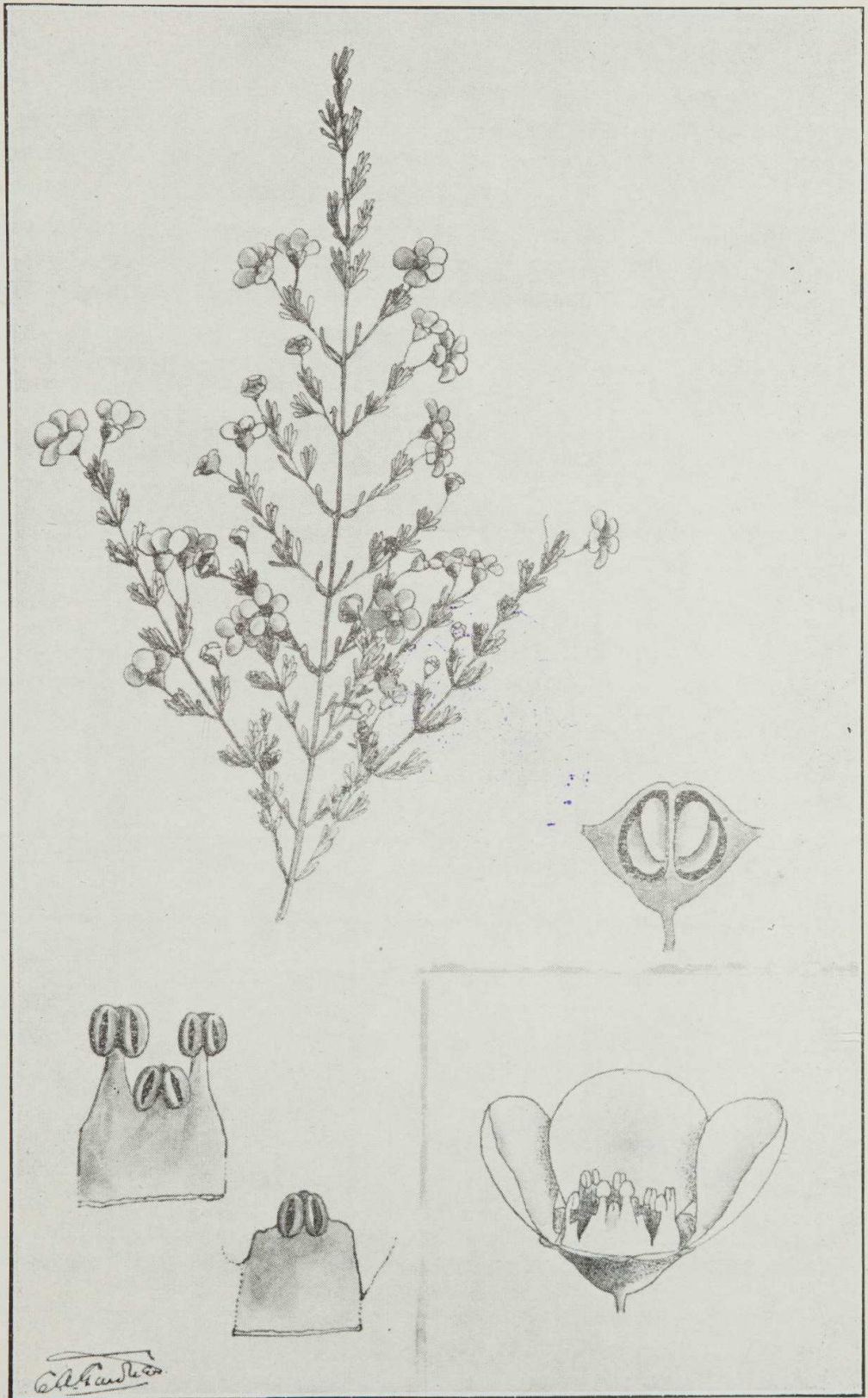
W. S. Gardner.



A-H. *Dryandra erythrocephala* Gardner.
I-L. *Balaustion microphyllum*, Gardner.



Baeckea muricata. Gardner.



Astartea heteranthera. Gardner.